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DEPARTMENTAL NOTICES.

Plants of the Avocado or Alligator Pear—*Persea gratissima*,—and Brazil nut—*Bertholletia excelsa*,—to be sold within the Peninsula at fifty cents each.

Seeds of *Hevea brasiliensis*—Para Rubber—as available from trees, twenty-eight years old, to be sold at three dollars per thousand up to the number of ten thousand, and at two dollars and fifty cents for every further thousand on the same order.

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Photos by] [*H. Overbeck, Esq.*

Cycas damaged by *Catochrysops pandava*.

THE

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CATOCHRYSOPS PANDAVA, A BUTTERFLY DESTRUCTIVE TO CYCADS.

Catochrysops pandava, Horsf., is a beautiful little butterfly when seen with its silky lavender blue wings expanded; but it is very destructive in a garden to Cycads: for the caterpillar is a *gourmet* and feeds on the youngest leaves, utterly destroying them, so that the plant is left untidy for the months which pass until it can produce a fresh crop. How untidy it can be, is seen in the accompanying plate. Cycads which had been attacked by the insect and had no young leaves left, produced in the Botanic Gardens a new crop at the end of three months, often only to be attacked again.

The butterfly is 30—35 mm. from tip to tip of its upper wings. The wings are silky lavender blue above shading slightly towards black, then bordered with a narrow line of black, outside a very narrow white line, with a black dot just inside the border on the lower wings and a fine slightly twisted black tail from the edge against it, this tail just tipped with white. Below the wings are dove grey with darker white-bordered wave markings and eyes chiefly in the outer half, and with a black eye marking against an orange patch at the hinder angle of the hinder wings. The body is steel grey below, and with the wings closed the insect at rest is well hidden by the pattern. The female insect is duller in colour above than the male especially by having much more black suffused through the blue on the upper surface of the wings: otherwise its colours are similar.

A female insect laying eggs, walks about the backs of the still curled pinnae of the Cycad leaves, moving the tip of her body up and down and at each light touch attaches a single egg to the surface of the plant.

These eggs are beautiful objects; they are depressed, and there is a slight pit at the unattached pole with round it rings of minute warts connected together by a slight webbing, the meshes increasing in size to the equator. Three or four days after the egg has been

laid a small white caterpillar breaks through outward and commences to feed; for that purpose generally moving to the upper side of the uncurving leaf. It is shaped like most caterpillars are, except for a tendency to draw its head under the body; it has relatively long, pale, but not numerous hairs. Later it changes colour and develops a fold down either side joined, each to the other, in a kind of collar at the back of the head, which quite alters its appearance; for now it is flattened, and the legs and head are hidden. In the course of three weeks, it has grown to a length of 8 mm. with a breadth of 3 mm. It is more conspicuously flattened towards the head and towards the tail than at the center of the body; but nevertheless is flattened throughout. Its colour is a reddish crimson, and the dorsal surface is covered with small black bristles among which over eight segments there are four undefined lines of smaller white clavate hairs; towards the side the bristles are colourless. From the flattened hinder end, two curious scent organs can be exserted; they are colourless and with a few colourless hairs; when exserted they are minute columns; and a kind of irresolute movement is given to them by repeated retractions and exsertions. This red grub can spin a thread at all times.

When mature at 21 days it pupates, on the back of a leaf or in some other sheltered place, into a short plump light green pupa hanging by its tail and girdled by a thread holding it against its support. The eyes come to show reddish and the wing covers look pale.

By the time pupation has been reached the pinnae of the leaf of the food plant have generally been utterly destroyed while the grub has been feeding for the last part of its time by burrowing into the fleshy young axis of the leaf. It moves about a little but never far. What with the gumming resulting from the wounds, and with the raggedness resulting from the dead scraps of pinnae left attached, the beauty of the plant has been utterly destroyed. The lower block on the plate shows about 30 destroyed leaves and five that have more or less escaped,—an evidence of the small distances through which the grubs move, for they had not wandered to the pinnae which had not received eggs.

The butterfly also appears not to move far, for Cycads at a distance no greater than a quarter of a mile from attacked Cycads, have been seen to escape repeatedly.

Two species of Cycas are attacked in the Botanic Gardens, *Cycas Rumphii*, and *Cycas siamensis*.

Other food plants have been looked for but not found. The cause of suspecting that the caterpillar has other foods is that young Cycad leaves are available only at intervals which it may be that the insects cannot always keep. But the length of the life of the butterfly on the wing has not been ascertained: it may be so long as to fill in the interval between its emergence at 5 weeks from the egg-laying and the Cycad's ability to produce a new foliage.

An arsenical spray may be used as a remedy.

I. H. Burkill.

IDENTITY OF A COCONUT HISPID.

Recently, Mr. R. M. Richards, of Caledonia Estate sent to me specimens of what Peninsular entomologists have been calling *Bronthispa froggattii*, a small but destructive Hispid beetle occurring on coconuts. It can be recognized by its small size, black color, and red pronotum. *Bronthispa froggattii* was originally described from the Solomon Islands, and since there was some question as to the positive identity of the Malayan form, specimens from Mr. Richards and also specimens which I had taken in Singapore were sent to Dr. Gestro in Genoa, one of the best known authorities on the *Hispidae*. Dr. Gestro now replies that he possesses typical specimens of *Bronthispa froggattii* and that our form cannot possibly be associated therewith, on the other hand he states that the Malayan beetle is clearly *Plesispa Reichei* Chap., originally described from Malacca. I do not know how the erroneous determination first got into Peninsular literature.

C. F. Baker.

PROMECOTHECA CUMINGII, BALY, ANOTHER COCONUT HISPID AND A PEST IN MALACCA.

Mature larva and imago of Promecotheca cumingii, enlarged 2½ times.

Upon a visit of inspection to Malacca in July, 1917 it was observed that some pest had been attacking the Coconut palms in a serious way between Malacca town and Tanjong Kling, seven miles distant. The effect of the attack was apparent to any one, even at some distance, by the brown colour of all the old leaves; every palm in the area of attack appeared as if scorched, appeared as if attacked by the moth *Brachartona* which produces this appearance: but on examination of the trees it was obvious that *Brachartona* had not done the damage.

The young leaves were found to be free, for the most part, from any cause of injury, but on the intermediate leaves sharply defined areas of dead tissue were to be seen: and on the older leaves these areas had become confluent, and the tissues were generally dead and often tattered. The cause of the injury was not detected on the first visit, but the limits of its attack were ascertained as above, Malacca town to Tanjong Kling, and inland only about a mile.

Arrangements were then made that an officer of the Department, namely Professor Baker, should thoroughly investigate the attack by an early visit; but advance information to the effect that the Government of the Philippines intended to recall him interfered with the plans in such a way that the next inspection in Malacca only took place in December, when the writer was fortunate enough to find the pest,—a beetle,—mature and on the wing. This beetle proves to be *Promecotheca cumingii*.

Promecotheca cumingii is about 10 mm. long, a flat bright umber beetle shaped as drawn on p. 3, which by day can be found resting on the shaded side of coconut leaves or sometimes on the leaves of other plants. Its food in maturity as well as when immature is the leaf of the coconut, the grub may also be found in the leaves of the Nipa palm and in the leaves of the Sago palm, but, so far in Malacca never abundantly.

The mature insect is apparently not of wide flight for it spreads only a little to isolated groves of coconut palms behind the continuous fringe that skirts the sea. However that it can live at a distance from the sea is proved by its appearance recently at Bringin some four miles inland; and doubtless if sufficiently searched for it would be found at other inland places.

Latterly it has spread along the coast to Pangkalan Balak at a distance of 14 miles from Malacca, as the crow flies. It seems to have in it the power of spreading further, and freely so long as the belt of coconuts is more or less continuous.

In the Philippine islands, this insect is a minor pest. Mr. C. R. Jones in the *Philippine Journal of Science*, Section D. viii., p. 127, after describing it, says that it has many enemies, predacious and parasitic, and that it is probable the parasites keep it in check. At present we have no knowledge that it has any enemies in Malacca, but this is because observation has not yet been made. This much, however, can be said (i) that something appears to have caused the pest to die down in the neighbourhood of Malacca Railway Station and (ii) that a few dead larvae may be found easily within the attacked leaves.

Jones describes the larva as cream-coloured; but I find it in colour between orange and umber. Jones states that the tubercles at the side of the body give rise to setae of six hairs each; I find nothing so regular, but a few hairs down the sides of the body. Jones states that the pupa is hairy; but it appears to me rather to have a coating of microscopic bristles. Except on these small points my observations agree with his; and I may conclude by quoting him, as I am convinced that the insect in Malacca is his. Jones states "This beetle belongs to the subfamily Hispinae of the family Chrysomelidae, which contains our worst leaf-eating beetles. There is little doubt that this species or representatives of this subfamily, occur in all coconut-growing countries. Frogatt reports a species of the family as being a most serious pest in the Solomon islands. The eggs are deposited singly on the underside of the leaflets and generally on the lower leaves of young palms.

The beetle eats a small hole through the lower epidermis of the leaf, leaving the edges of the hole very rough. The egg is inserted into this hole and cemented into place with a yellowish glutinous secretion which turns dark brown upon hardening, and resembles dried leaf tissue. The eggs are flat semielliptical brownish bodies, shaped somewhat like a pumpkin seed. The period of incubation of 286 eggs averaged 13.5 days, of which the maximum was 15 and the minimum 13. Upon hatching the larva eats its way through the egg-wall and directly into the tissue of the leaf, where it spends its entire larval and pupal stages. The larvae are fleshy footless grubs and average about 1.2 mm. in length when newly hatched. The head is the largest segment. The average length of the full-grown larva is 9.54 mm., and the average width of the head cast is 1.54 mm. The average time required in the larval stage is 32 days, twenty eight of these are spent in feeding, and four days without feeding during which time the larva changes into a pupa. During development, the larva feeds upon the parenchyma of the coconut leaf, and except when moulting it can be found at the end of the chamber opposite the egg. The larva eats in one direction only, leaving the old eggshell at the starting point. When moulting and changing into a pupa it recedes to the centre of its chamber. A characteristic habit of the larva is the deposition of its excrement in two rows one on each side of the excavated chamber. The average time occupied in the pupal stage is 7.3 days of which the maximum was twelve and the minimum five days. The pupa is orange-chrome or burnt sienna. The beetles vary from 7.5 to 10 mm. in length and are from 1.6 to 2 mm. in width. The beetles are sluggish and do not fly readily upon being disturbed. They rest by clinging slightly to the under side of the leaf, antennae extended forward, flat against the leaf. They crawl about promiscuously on the leaves of young coconuts and feed extensively upon the tissues between the veins of the leaflets. The injury has the appearance of a slight cut, but does not entirely penetrate the leaf. The injury done by the larva is greater than that of the adult, as a single larva will excavate a place in the leaf from 12 to 16 cm.* long and 1.5 to 3 cm.* wide. The tissue affected soon dies and becomes brown."

Jones, lastly writing of repressive measures suggests hand-picking by children; but so high are most of the attacked trees in Malacca that this is not to be thought of. The same difficulty attends the use of hydrocyanic gas. And indeed the only remedy seems to be promised by protecting or increasing the insect's natural enemies, for which purpose it would possibly be necessary to collect a supply in the Philippine islands.

By Professor C. F. Baker's kind offices, Dr. Gestro has seen specimens and confirms the determination.

I. H. Burkill.

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*There is a mistake on p. 130 of the Philippine Journal of Seince D. viii. in regard to the length of these tunnels, millimetres standing twice for centimetres. A reference to the plate there referred to proves it. Tunnels in Malacca are usually about 10 cm. long and 1 cm. wide; 3 cm. wide is excessive.

A BEETLE WHICH ATTACKS YAMS.

There is a beetle in Singapore of the genus *Lema* or *Criocera* which attacks yams.

Into the bulbils of *Dioscorea bulbifera* when mature it burrows to feed itself; and lives on the plants continuously and may often be seen "in cop." half in these burrows and half out. In the burrows the eggs are laid: they are of a pale yellow at first, but the colour darkens almost to horn-colour. So far as seen the eggs are not more than four or five in number in each group. They seem to take some time in hatching. The young grub is white with a black head and a small black mark just behind it. It has tiny hairs. When mature it is of a dull red and then it leaves the bulbil within which it has fed and presumedly burrows into the earth. The bulbil by this time is in Singapore a putrid mass, tunnelled all through.

So far no economic importance attaches to the insect, because it is only known to attack the aërial bulbils of *Dioscorea bulbifera* which, though eaten in India and Java and elsewhere, are not used in the Malay Peninsula.

I. H. Burkill.

SOME TESTS OF GARDEN VEGETABLES IN SINGAPORE.

The Singapore markets are well supplied with the coarser garden vegetables: they afford fair carrots and beets, coarse sweet potatoes, a fair cruciferous substitute for the cabbage and abundance of the large and very rank Chinese radishes. Small but very good tomatoes are occasionally to be obtained. But certain features of the Chinese cultivation are abhorrent to the European; and he does not use these vegetables with any great zest, even after the most careful methods of cleansing that can be employed.

Most Europeans in Singapore maintain more or less spacious compounds, thus furnishing extraordinarily good opportunities for the establishing of home-gardens. Many have tried to do so, but rarely with any marked success: and moreover when in isolated instances success is achieved, the chance experimenter has forgotten the trade name of the seed which gave him the results, or has not got the name and address of the firm which produced that seed.

For in this matter it must be recognised that a great number of distinct varieties with accepted trade names have been isolated and established by expert horticulturists and are bred practically true for the trade, often through very considerable series of years. Of beans for instance, there are many hundreds on the seed-markets of the world now, and these differ remarkably in form, size, and colour of bean, in edibility of pod, in length of time to maturity and in reaction to soil, climate and disease. Some thrive best in the wet season, others in the drier time. Some prefer very light

soils; while others do very well on heavy soils. Some do as well in the Tropics, as in the temperate regions, while others succumb at once in the hot countries. Thus it may be readily seen that the prospective gardener in the Tropics can have failure after failure by the choice of races unsuited for his season and location, although the same races may be the most highly recommended for another country.

This is not only true for beans, but for all other crops. The solution of the difficulty is very simple, so simple in fact that the less progressive countries never give it the attention needed to secure the most certain results in the shortest time possible. This work in its simplest phase may all be included under the general head of *acclimatisation*. It is work full of the keenest interest, and pregnant with great economic possibilities. Planters and other public-spirited citizens have often not been content to await the laboured and usually long delayed action of government, although this is a natural government-function beyond the means of most private individuals. So we find acclimatisation societies scattered through the tropics and newer countries, which accomplish not a little by united effort and themselves profit by what is accomplished.

To accomplish the most definite and conclusive results, acclimatisation work must be thoroughly comprehensive; that is to say all varieties in the trade must be thoroughly tested on *all* kinds of soil, in *all* seasons, by *all* methods of culture, and in *all* parts of the country. The very variety which the experimenter overlooked, might be the very one to give the greatest success of all. A variety discarded as useless in a valley-plain has, in known cases, proved to be the greatest success in a near-by hill area. A variety neither specially well-known nor highly recommended in the country of its origin, has been found to give far better results under new conditions than some other varieties very highly recommended. Therefore if we are to determine the best bean-varieties for a new country, we must first obtain generous samples of absolutely *all* the varieties in the trade of Europe and of America, with special care to secure all of the varieties grown in the warmer parts of these regions. This will bring us into touch with such great seed-houses as Sutton in England, Vilmorin in France, Shortum, Burpee and Henderson in America. With abundant stocks in hand it then becomes a matter of good head-quarters facilities, wide co-operation and scientific exactness in the arrangement and control of all the work, and in the recording and dissemination of results. This says nothing of plant-breeding work, which naturally follows acclimatisation, and which is also full of the greatest economic possibilities.

It became possible in September, 1917, to put into operation a small preliminary series of acclimatisation trials in the Economic Garden in Singapore. Most countries involved in the Great War have been concentrating all possible energy on stimulating active interest in food crops; and an active and effective campaign in this direction possibly would not have cost the Government of the Settlements nearly so much as War allowances entail, such as have their

dense heads of large leaves reverted to a condition akin to the wild form running up slender stems with scattered widely separated leaves; such were Nos. 7250, 7090, 7262 and 7256. Two of the varieties 7258 and 7096 while somewhat leggy gave very good leaves. No. 7086 proved to be a thoroughly good lettuce for Singapore, yielding more than four pounds of first class bunches from five square yards of soil. No. 7274 turned out to be in Singapore a very delicate small smooth leaved lettuce, quite fair for Singapore. No. 7097 is a very peculiar lettuce, having leaves speckled with pale brown. It runs somewhat to stems but produces fair leaves. No. 7260 made a fairly good bunch, of large smooth leaves. Therefore, for this season and soil, Nos. 7086 and 7260 may be used with assurance of obtaining good results. The remainder should be given a further trial.

Tomatoes.

Tomatoes are the most tender plants of the garden and the most difficult to handle successfully. They are extremely susceptible to disease, especially to the so-called "solanaceous wilt" which is widely spread in the tropics and also affects tobacco and some other plants. Most old garden soils are infected with the organisms of this wilt disease. Therefore, for surest success with tomatoes, we must use either virgin soil, or a soil thoroughly sterilized by burning, by steam, or by boiling water. Also tomatoes thrive better on well-manured well-drained light sandy loams than on heavy or soggy soils. All of these well-known facts came out clearly in the course of the trials, here described.

The young plants were handled in the same way as lettuce. They were then divided into lots and planted in a variety of situations and on a variety of soils. Facilities were lacking for sterilising any considerable amount of soil; and labour was lacking for opening up new ground. The plants put out, whatever their variety, on the heavy soggy soils or on the old soils were soon destroyed by wilt. However on one small part of the garden there exist a few well-raised beds of very sandy soil; and on these beds when well-manured, three out of the many varieties developed rapidly into strong plants, only a few among them dying from wilt. On some beds nearby but less sandy, No. 7173 (Early Ruby Tomato) developed far enough to set large good tomatoes before it succumbed to wilt. The varieties which showed the greatest resistance to wilt and the readiest adaptability to the Singapore conditions at the season of their testing were No. 7169 (Buckeye State) and 7146 (Perfection). It seems certain that fine results may be obtained with these two if proper methods are used. While the facilities available did not permit of the trial being properly carried out on a garden scale, interesting result were got on using pots filled with prepared soil. Among these are pot-grown plants there was very much less wilt and at the time of writing they are setting healthy young tomatoes.*

* It is not recorded how many fruits they gave, but No. 7160 gave one fruit weighing 2¾ oz.; two fruits of No. 7176 weighed together 2½ oz, two of 7173 weighed together 2¼ and three of 7147 weighed together 5½ oz., which figures indicate the size. I.H.B.

From the whole series of experiments it is evident that comprehensive trials with varieties of tomatoes would soon lead to very practical results.

Garden Beans.

Coarse beans of various sorts can be obtained almost anywhere in the tropics, but the finer garden beans of temperate regions, such as the Butter and Wax beans and French limas, are usually conspicuous by their absence. We have had remarkable success with certain varieties from each of these types. In the short time available, we were dependent on those which it was possible to obtain from the Philippine College of Agriculture; and these included.

7194 Kentucky Wonder Pale Bean.
7212 Carpenteria Pale Bean.
7205 Kentucky Wonder Golden Wax Bean.
7197 Currier's Rust Proof Bean.
7211 Henderson's Bush Lima.
7210 Siebert's Early Lima.
7207 Giant polded Lima.
7209 Wood's Prolific Lima.
7208 Jackson Wonder Bush Lima.
7192 Pencil-pod Black Wax Bean.
7191 Black German Wax Bean.
7206 Fordham Bean.

Most of these varieties have grown with great vigor on our old garden soils. But No. 7209 turned out to be a poor grower and yielder: and Nos. 7191 and 7192 were practical failures, being poor growers, becoming badly blighted and producing but few pods. The remainder, all successful, can be divided into two groups, the very early, and the very late. Among the latter are Nos. 7212, 7210, 7207, 7208 and 7206. These have all grown well but have not come to cropping at this time.§ No. 7194 grows well, and gives a good early crop of large green snap beans. No. 7205 is a strong grower and produces a large early crop of very large yellow wax beans. No. 7197 produces yellow snap beans on a low bushy plant. Here it is the earliest of all, giving, within a few weeks, an abundant crop of fine yellow wax beans, and dying off rapidly as soon as the crop is made. No. 7211 is a rapid grower, and gives a quick and abundant crop of fine small limas.

Therefore, for quick results in two distinct types Nos. 7197 and 7211 are to be considered first choice. But the other varieties mentioned above can be used to good advantage. By this use of diverse varieties, together with successive plantings, the Singapore resident will probably have no difficulty in obtaining good supplies of the finest garden beans throughout the year. Since this is a matter of great economic importance to the whole people, these trials should be continued and on a more comprehensive scale.

§ The crop matured by the late races was insignificant, and the pods were not well filled. E.H.M.

Soy Bean.

The Soy bean is of enormous importance in Japan, Manchuria and China; and thence a great feature in world commerce. It is now being extensively planted in the United States. It has been said that it could not be grown in the Tropics, and some first trials of it in the Philippines a few years ago led to statements that it could not be successfully grown there. However this was merely a case of the wrong variety for the season in which the planting was done; for there are many distinct varieties of Soy of quite different possibilities; and more comprehensive trials in the Philippine islands developed the fact that certain varieties were suited only to the wet season, others only to a drier period, and some were heavier yielders of hay, others of grain, and so on, it now being recognized that soy is a practicable crop for the country.

Three varieties were brought to Singapore from the Philippines. Two did not germinate. The third gave but few plants, but these grew well and are now setting pods. Great care should be taken to continue and develop this culture† since out of it may arise a real asset to the country. Comprehensive trials of all the soys should certainly be carried out here. The great value of the plant in furnishing direct food for man and beast is but a part of its value, since its secondary products are used the world over. Vast quantities of the famous soy sauce* are consumed yearly in all parts of the world, while bean curds and oil from this source are well known.

Peanuts.

The common peanuts of the Singapore market are small and of the Spanish type. There are a number of varieties in other countries which yield far larger nuts, better for direct eating, though some of these do not give larger total yields under similar conditions, nor larger oil percentages than the small Spanish peanuts. Four varieties were used in the trials under description, viz., San Mateo, Montalban, American and Kinorales, all of which have been grown with success in the Philippines. These were planted in beds similar to the varieties of Radish as described above, there being seed only for five square yards of each variety. The seed Kinorales proved to be bad, the bed yielding but one plant, which, however, as also all plants of the other varieties, grew with great vigor. The seed was put in on August 1st and the crop harvested fifteen weeks later. As the plants were ripening off, the leaves became spotted with the common fungus *Cercospora personata*, which, luckily, rarely attacks the plant in its prime. The yields of shelled dried nuts were as follows:

San Mateo	.. ..	23 oz.
Montalban	.. ..	26½ oz.
American	.. ..	22¾ oz.

†The second crop of Soy bean was for some unknown reason a complete failure. E.H.M.

*Basis also for one of the best known English table sauces.

This seed as well as that próduced by the one plant of Kinorales, will be immediately replanted to increase the stock.*

YAUTIAS.

Many varieties of this important tropical root crop, yielded by *Xanthosoma sagittifolium* and *X. violaceum*, are grown in the American Tropics. In Cuba under the name of "malangas" they are standard vegetables. In some respect the yautias resemble the gabis (kladi) produced by *Colocasia antiquorum*. But they are better yielders and produce a vegetable better relished by Europeans, since they lack the slimness of the gabi after cooking; also they can be grown with greater success as a field crop in fields high and dry enough to be readily plowed and cultivated by bullocks. They appear not to be susceptible to the very injurious colocasia mildew which disease is widely distributed in the orient. Nine distinct varieties have been introduced from the Philippines and are now well advanced in growth, as follows:

588 (unnamed).
444 Rolliza.
309 Rolliza blanca.
439 Trinidad Yellow.
586 (unnamed).
443 Grey Jack.
441 Mi Senora.
1521 San Fernando Po.
440 Prieta.

The history of the parents of this stock is as follows:—a series of varieties were brought to California from Porto Rico and carried through one generation after which they were taken to the Philippines where they have been very successfully carried through a number of generations. Our present stock was selected from these Philippine cultures.

The Gardens formerly possessed one variety of *Xanthosoma sagittifolium* and a very robust variety of *Alocasia antiquorum* (Kladi udang). The latter since it possesses an abundance of runners belongs to the group of varieties known as Dasheens. This plant not only furnishes tubercles, and a good pot herb (the youngest tenderest leaves), but the runners can be covered and bleached and make a very fair substitute for asparagus. The new introductions will be put out in beds alongside the two previously planted varieties, so that complete comparisons will be possible within ten months, when the crop is ready. These plants should be multiplied and generally disseminated through the colony.

The dasheens furnish three types of planting stock, runners, side sprouts and trunk tops, hence beds of the Kladi Udang mentioned above, have been separately planted with these in the present cultures in order to determine any possible difference in length of time to maturity or in final yield. C. F. BAKER.

* Except the San Mateo Pea nut, none of the races in the second planting gave results worth recording. San Mateo grew well although planted in rather unsuitable soil; and produced plenty of well filled large pods But thieves mice and squirrels got at them, and when the bed was dug the results did not represent the produce. It is being replanted. E.H.M.

Host Index.

for

Penzig's and Saccardo's, Icones Fungorum Javanicorum Diagnoses Fungorum in insula Java Collectorum and Raciborski's, Parasitische Algen und Pilze Javas.

Acacia—dead limbs.
Botryodiplodia acacigena, Penz. et Sacc.
Acacia—on Diplodia on.
Nectria episphaerioides, Penz. et Sacc.
Acer laurinum.
Criella aceris-laurini, (Pat.) Sacc. & Syd.
Nymanomyces aceris-laurini, (Pat.) Henn.
Parodiella aceris, Rac.
Schizothyrium aceris, (Henn. & Lind.) Pat.
Synglonium insigne, Penz. et Sacc.
Achyranthes.
Cystopus bliti, (Riv.) de Bary.
Acorus terrestris.
Uredo acori, Rac.
Acrocomia sclerocarpa.
Winterella eutypoides, Penz. et Sacc.
Acronodia punctata.
Aecidium puspa, Rac.
Asterina alpina, Rac.
Acrostichum (Elaphoglossum) *callaefolium.*
Scolecopeltis salacensis, Rac.
Adhatoda vasica.
Oidium tabaci, Thuem.
Agaric.
Spicaria elegans, (Corda) Harz.
Alsophila contaminans.
Hysterostomella contaminans.
Alsophila—dead petioles.
Dasyscypha javanica, Penz. et Sacc.
Amonius.
Hypocrella discoidea, (B. & Br.) Sacc.
Antidesma bunius.
Uredo antidesmae, Rac.
Antidesma dioica.
Uredo antidesmae-dioicae, Rac.
Antidesma heterophylla.
Elsinoe antidesmae, Rac.
Arachis hypogaea.
Septogloeum arachidis, Rac.
Araliaceae—leaves.
Sphaerella longispora, Penz. et Sacc.
Araneae.
Gibellula phialobasia, Penz. et Sacc.

Arenga saccharifera.
Auerswaldia arengae, Rac.
Graphiola arengae, Rac.
Arthrophyllum—dead petioles.
Diplodia arthrophylli, Penz. et Sacc.
Artocarpus incisa.
Rhizopus artocarpi, Rac.
Arundina speciosa.
Caeoma arundinae, Rac.
Arundinaria.
Uredo arundinariae, Sydow.
Arundinaria—young twigs.
Konradia bambusina, Rac.
Asplenium pallidum.
Hymenoscypha asplenii, Rac.
Bambusa.
Didymosphaeria polysticta, (B. & C.) Sacc.
Hymenopsis ellipsospora, (Fuck.) Sacc.
Konradia secunda, Rac.
Bambusa—dead.
Acerbia culmigena, Penz. & Sacc.
Astrocystis mirabilis, B. & Br.
Campsotrichum elegans, Penz. & Sacc.
Chaetosphaeria silva-nigra, Penz. & Sacc.
Comosporium bambusae, Thuem.
Didymella maculosa, Penz. & Sacc.
Didymosphaeria fusispora, Penz. & Sacc.
Didymosphaeria minutella, Penz. & Sacc.
Didymosphaeria striatula, Penz. & Sacc.
Erinella albida, Penz. & Sacc.
Erinella tomentella, Penz. & Sacc.
Eutypa bambusina, Penz. & Sacc.
Harpographium nematosporum, Penz. & Sacc.
Helicosporium intermedium, Penz. & Sacc.
Helotiella myoleuca, Penz. & Sacc.
Heteronectria spirillispora, Penz. & Sacc.
Melanconium sphaerospermum, (Pers.) Lk. subsp. bambusarum, Penz. & Sacc.
Melanomma tornatum, Sacc. & Paol.
Melanomma trochus, Penz. & Sacc.
Melanopsamma patellata, Penz. & Sacc.
Nectria vulgaris, Speg.
Nummularia minutula, Penz. & Sacc.
Ophiobolus javanicus, Penz. & Sacc.
Podosporium tjibodense, Penz. & Sacc.
Pteridospora javanica, Penz. & Sacc.
Rosellinia formosa, Penz. & Sacc., var. flavozonata, Penz. & Sacc.
Scirrhia bambusina, Penz. & Sacc.
Stilbum longipes, Penz. & Sacc.
Tubeufia javanica, Penz. & Sacc.
Winteria oxyspora, Penz. & Sacc.

Castanopsis—spines of rotten fruits.
Lanzia reticulata, Penz. & Sacc.
Phialea glaucescens, Penz. & Sacc.
Cecropia schiedeana—rotten wood.
Anthromycopsis broussonetiae, Pat. et Trab. subsp. minor, Penz. & Sacc.
Cercocoma macrantha.
Uredo chonemorphae, Rac.
Chlamydomonas pluvialis.
Polyphagus nowakowskii, Rac.
Chonemorpha macrophylla.
Uredo chonemorphae, Rac.
Cinnamomum zeylanicum.
Aecidium cinnamonii, Rac.
Scolecotrichum cinnamonii, Rac.
Clerodendron blumeanum.
Caeoma clerodendri, Rac.
Clerodendron fragrans.
Caeoma clerodendri, Rac.
Coccids—on coriaceous leaves.
Aschersonia javanica, Penz. & Sacc.
Cocos nucifera.
Pestalozzia palmarum, Cooke.
Coix lacryma-jobi.
Phyllachora coicis, Henn.
Ustilago coicis, Rac.
Coleoptera—larva.
Cordyceps citrea, Penz. & Sacc.
Cordyceps obtusa, Penz. & Sacc.
Coleoptera—pupa.
Cordyceps coccinea, Penz. & Sacc.
Colocasia esculenta.
Phytophthora colocasiae, Rac.
Connarus diversifolia.
Stagonospora disseminata, Rac.
Corypha gebanga—dead leaves.
Bonordeniella memoranda, Penz. & Sacc.
Cucurbita.
Oidium tabaci, Thuem.
Culms.
Neopeckia pumila, Penz. & Sacc.
Culms—dead (see stems).
Boerlagella laxa, Penz. & Sacc.
Chromosporium pallens, Penz. et Sacc.
Hypocrea gelatinosa, (Tode.) Fr.
Ophioceras dolichostomum, (B. & C.) Sacc.
Culms—grass.
Torula glomerulosa, Penz. & Sacc.
Curculigo latifolia.
Didymosphaeria impar, Penz. et Sacc.
Puccinia curculigo, Rac.

Curculigo recurvata.
Puccinia curculigo, Rac.
Cyathea orientalis.
Asterina cyathearum, Rac.
Dendrophthora pentandra.
Puccinia macrocarya, Rac.
Derris.
Puccinia periodica, Rac.
Derris elliptica.
Cryptomyces pongamiae, (B. & Br.)
Triphragmium pulchrum, Rac.
Dianella javanica.
Uredo dianellae, Rac.
Dinochloa tjankorreh.
Mindogia bambusina, Rac.
Phyllachora tjankorreh, Rac.
Desmodium umbellatum.
Cercosporella atropunctata, Rac.
Dioscorea aculeata.
Uredo dioscoreae-aculeatae, Rac.
Dioscorea alata.
Cercospora ubi, Rac.
Uredo dioscoreae-alatae, Rac.
Dioscorea filiformis.
Uredo dioscoreae-filiformidis, Rac.
Diospyros.
Aecidium rhytismoides, Rac.
Diospyros—seeds.
Aspergillus penicillopsis, (Henn. & Nym.), Rac.
Diplodia—on Acacia.
Nectria episphaerioides, Penz. & Sacc.
Dung—buffalo.
Ascobolus latus, Penz. et Sacc.
Saccobolus kerverni, (Cr.) Boud.
Earth.
Barlaeina albo-coerulescens, Penz. & Sacc.
Barlaeina connexella, Sacc. subsp. tjibodensis, Penz. & Sacc.
Helvella lacunosa, Afz. subsp. javanica, Penz. & Sacc.
Lachnea longiseta, Penz. & Sacc.
Peziza citrina, Penz. & Sacc.
Peziza sparassiformis, Henn.
Phaeomacropus fleicherianus, Henn.
Podocrea cordyceps, Penz. & Sacc.
Eichornia crassipes.
Pachysterigma grisea, Rac.
Elaeagnus latifolius.
Aecidium elaeagni, Rac.
Elaeocarpus augustifolius.
Dothidella elaeocarpi, Rac.
Elettaria.
Phyllachora elettariae, Pat.

Schroeteriaster elettariae, Rac.
Trichosporium olivastrum, Sacc.
Elettaria—dead.
Hypocrella discoidea, (B. & Br.) Sacc.
Montoniella polita, Penz. & Sacc.
Orbilia neglecta, Penz. & Sacc.
Elettaria—dead leaves.
Ceuthocarpon tjibodense, Penz. & Sacc.
Cryptothecium javanicum, Penz. & Sacc.
Lophodermium javanicum, Penz. & Sacc.
Oxyspora carneola, Sacc.
Trichopeziza porioides, Penz. & Sacc.
Xenosporium mirabile, Penz. & Sacc.
Elettaria—dead stems.
Acanthostigma nectrioideum, Penz. & Sacc.
Bactrosphaeria asterostoma, Penz. & Sacc.
Botrytis vulgaris, Fr.
Ceratostomella polyrrhyncha, Penz. & Sacc.
Ciliciopodium macroporum, Penz. & Sacc.
Diaporthe javanica, Penz. & Sacc.
Helotiella aurea, Penz. & Sacc.
Melchioria leucomelaena, Penz. & Sacc.
Nectria albo-fimbriata, Penz. & Sacc.
Nectria dolichospora, Penz. & Sacc.
Nectria raripila, Penz. & Sacc.
Nectriella rufo-fusca, Penz. & Sacc.
Nectriella setulosa, Penz. & Sacc.
Pezizella armeniaca, Penz. & Sacc.
Pezizella tjibodensis, Penz. & Sacc.
Phlyctaena variabilis, Penz. & Sacc.
Rhabdospora elettariae, Penz. & Sacc.
Rosellinia formosa, Penz. & Sacc.
Tubeufia coronata, Penz. & Sacc.
Zignoella acervata, Penz. & Sacc.
Zignoella interspersa, Penz. & Sacc.
Elettaria—on Melchioria on.
Nectriella pallidula, Penz. & Sacc.
Entada—dead leaves.
Stegia nitens, Penz. & Sacc.
Equisetum debile.
Stamnaria equiseti, (Hoffm.) Sacc.
Eriodendron anfractuosum.
Ramularia eriodendri, Rac.
Erythrina lithosperma.
Telimena erythrinae, Rac.
Eugenia (Jambosa) *aquea.*
Haplosporella dendritica, Rac.
Eugenia or *Ficus.*
Meliola octospora, Cooke.
Eutypa heteracantha.
Mollisia obconica, Penz. & Sacc.
Ficus. (See also Eugenia).
Hyalodothis incrustans, Rac.

Ficus hispida.
Phyllachorà marmorata, Rac.
Ficus leucanthoma.
Phyllachora decaisneana, (Lev.) Sacc.
Filices—dead leaves.
Helotium pteridophilum, Penz. & Sacc.
Filices—dead petioles of tree ferns.
Delpontia pulchella, Penz. & Sacc.
Flemingia lineata.
Parodiella perisporioides, (B. & C.) Speg.
Freycinetia imbricata.
Uredo freycinetiae, Rac.
Fruit—dead rind.
Stilbum fructigenum, Penz. & Sacc.
Vermicularia longiseta, Penz. & Sacc.
Garcinia purpurea—bark.
Pellionella deformans, Penz. & Sacc.
Gardenia lucida.
Balladyna gardeniae, Rac.
Geophila reniformis.
Puccinia geophilae, Rac.
Gossypium herbaceum.
Uredo gossypii, Lag.
Grass culms. See *Culms.*
Torula glomerulosa, Penz. & Sacc.
Griffithia fragrans.
Endophyllum griffithiae, Rac.
Heliotropium.
Oidium tabaci, Thuem.
Helminthosporium—on Elettaria.
Rhabdospora elettariae, Penz. & Sacc.
Heptapleurum.
Triphragmium thwaitesii, B. & Br.
Hibiscus tiliaceus.
Physalospora hibisci, Rac.
Hydrocotyle.
Stigmatea hydrocotyles, Rac.
Hymenoptera—head.
Cordyceps lachnopoda, Penz. & Sacc.
Imperata arundinacea.
Micropeltis alang-alang, Rac.
Inocarpus edulis.
Uromyces inocarpi, Rac.
Insect excrement.
Isaria thyrsoidea, Penz. & Sacc.
Insects. (See also *Coccids, Coleoptera, Hymenoptera, Lamellicorn, Larva, Leaves, Coccids on; Lepidoptera, Mosquitoes, Termites, Vespa*).
Isaria thyrsoidea, Penz. & Sacc.
Ipomoea.
Meliola quadrispina, Rac.

Ipomoea batatas.
Ramularia batatae, Rac.
Ipomoea pes-caprae.
Aecidium ipomoeae, Thuem.
Ipomoea turpethum.
Cystopus convolvulacearum, Otth.
Justicia gendarussa.
Puccinia thwaitesii, B. & Br.
Kentia—dead leaves.
Anthostomella grandispora, Penz. & Sacc.
Kentia.
Pestalozzia funerea, Desm.
Korthalsia—dead petioles.
Phaeodiscula gonospora, Penz. & Sacc. subsp. atrata, Penz. & Sacc.
Lamellicorn—larva.
Cordyceps citrea, Penz. & Sacc.
Lasianthus.
Gibellina concentrica, Rac.
Lasianthus latifolius.
Coccomyces tjibodensis, Rac.
Larva.
Botrytis tenella, Sacc.
Cordyceps fleischeri, Penz. & Sacc.
Isaria alborosea, Penz. & Sacc.
Lauracea—leaves.
Laestadia veneta, Sacc. & Speg.
Leaves—living.
Hypocrella scutata, (Cooke) Sacc.
Pestalozzia leucodisca, Penz. & Sacc.
Sphaerella creberrima, Penz. & Sacc.
Trichosporium arborescens, Penz. & Sacc.
Triphragmium thwaitesii, B. & Br.
Leaves—coriaceous and subcoriaceous.
Botryosphaeria phyllachoroides, Penz. & Sacc.
Ceuthocarpon depokense, Penz. & Sacc.
Erikssonia pulchella, Penz. & Sacc.
Gloeosporium anceps, Penz. & Sacc.
Lembosia diffusa, Wint. subsp. breviuscula, Penz. & Sacc.
Linospora capillaris, Penz. & Sacc.
Lophodermium maculare, (Fr.) de Not.
Micropeltis leucoptera, Penz. & Sacc.
Micropeltis macropelta, Penz. & Sacc.
Pestalozzia leucodisca, Penz. & Sacc.
Rinia spectabilis, Penz. & Sacc.
Venturia euchaeta, Penz. & Sacc.
Leaves—coriaceous—coccids on.
Aschersonia javanica, Penz. & Sacc.
Leaves—coriaceous—dead.
Coccomyces dentatus, Sacc. var. hexagona, Penz. & Sacc.
Dasyscypha albidula, Penz. & Sacc.

Patinella phyllogena, Penz. & Sacc.
Sordaria tjibodiana, Penz. & Sacc.
Leaves—dead.
Actiniceps thwaitesii, B. & Br.
Isaria thyrsoidea, Penz. & Sacc.
Xylaria aristata, Mont.
Leguminosa—leaves.
Parodiella perisporioides, (B. & C.) Speg.
Leguminosa—pods.
Xylaria heloidea, Penz. & Sacc.
Lepidoptera—larva.
Cordyceps atro-brunnea, Penz. & Sacc.
Cordyceps coccinea, Penz. & Sacc., subsp. subochracea, Penz. & Sacc.
Cordyceps deflectens, Penz. & Sacc.
Isaria alborosea, Penz. & Sacc.
Lespedeza cytisoides.
Woroninella vulcanica, Rac.
Leucoxylon—seeds.
Aspergillus penicillopsis, (Henn. & Nym.) Rac.
Lichenes.
Gliocladium pulchellum, Penz. & Sacc.
Limbs—dead.
Anthostoma valsarioides, Penz. & Sacc.
Anthostoma verrucula, Penz. & Sacc.
Arthrosporium tenue, Penz. & Sacc.
Belonidium tabacinum, Penz. & Sacc.
Botryodiplodia longipes, Penz. & Sacc.
Cephalothecium roseum, Corda.
Cladotrichum socium, Penz. & Sacc.
Cylindrum fugax, Penz. & Sacc.
Dasyscypha isabellina, Penz. & Sacc.
Dasyscypha ochrolenca, Penz. & Sacc.
Davincia helios, Penz. & Sacc.
Diatrype princeps, Penz. & Sacc.
Enchnoa chaetomioides, Penz. & Sacc.
Erinella carneola, Penz. & Sacc.
Erinella citrino-alba, Penz. & Sacc.
Eutypa heterantha, Sacc.
Graphium desmazierii, Sacc.
Helotium subserotinum, P. Henn. & Nym.
Hymenula inaequalis, Penz. & Sacc.
Hymenula tjibodensis, Penz. & Sacc.
Hypocrea catoptron, B. & Br.
Hypocrea fulva, Penz. & Sacc.
Hypocrea gelatinosa, Fr. subsp. oligotheca, Penz. & Sacc.
Hypocrea longicollis, Penz. & Sacc.
Hypocrea pulchella, Penz. & Sacc.
Hypoxylon annulatum, (Schw.) Mont.
Hypoxylon anthracoderma, Speg.
Hypoxylon microsorum, Penz. & Sacc.
Hypoxylon rubellum, Penz. & Sacc.

Hysteriographium oligomerum, Penz. & Sacc.
Karschia nigerrima, Sacc. subsp. globuligera, Penz. & Sacc.
Lophodermium hypodermoides, Penz. & Sacc.
Megalonectria pseudotrichia, (Schw.) Speg.
Nectria ambigua, Penz. & Sacc.
Nectria coronata, Penz. & Sacc.
Nectria eustoma, Penz. & Sacc.
Nectria leucotricha, Penz. & Sacc.
Nectria radians, Penz. & Sacc.
Nectria vulgaris, Speg.
Nectria xanthostroma, Penz. & Sacc.
Nectriella aurantia, Penz. & Sacc.
Neopeckia diffusa, (Schw.) Starb.
Neopeckia pumila, Penz. & Sacc.
Ophioceras dolichostomum, (B. & C.) Sacc.
Ophioceras majusculum, Penz. & Sacc.
Patellaria callispora, Penz. & Sacc.
Patinella chlorosplenoides, Penz. & Sacc.
Pezizella glaberrima, Penz. & Sacc.
Rhynchostoma rhytidosporum, Penz. & Sacc.
Rosellinia beccariana, Ces.
Rosellinia bunodes, (B. & Br.) Sacc.
Rosellinia obtusispora, Penz. & Sacc.
Rosellinia pulvis-pyrius, Penz. & Sacc.
Sordaria botryosa, Penz. & Sacc.
Stictis pallidula, Sacc.
Stilbum cinnabarinum, Mont.
Stilbum minutulum, Penz. & Sacc.
Stilbum parviceps, Penz. & Sacc.
Thuemenella javanica, Penz. & Sacc.
Torula heteromorpha, Penz. & Sacc.
Trichosphaeria proxima, Penz. & Sacc.
Trinacrium subtile, Riess, subsp. tjibodiense, Penz. & Sacc.
Tubeufia anceps, Penz. & Sacc.
Valvaria massarioides, Penz. & Sacc.
Vermicularia longiseta, Penz. & Sacc.
Xylaria aristata, Mont.
Xylaria humilis, Penz. & Sacc.
Xylaria oocephala, Penz. & Sacc.

Limbs—living.
Fleischeria javanica, Penz. & Sacc.

Liquidambar sp.?—
Astrosporium chrysocephalum, Penz. & Sacc.

Litsea chrysocoma.
Phyllachora laurinearum, Rac.

Livistona olivaeformis—dead bark.
Zignoella omphalostoma, Penz. & Sacc.

Lonicera—leaves.
Criella lonicerae, Henn.

Mallotus moluccanus.
Cronartium malloti, Rac.

Mangifera indica.
Gloeosporium mangiferae, Rac.
Mangifera kemanga.
Cronartium kemangae, Rac.
Mapania.
Puccinia mapaniae, Rac.
Marattia sambucina.
Morenoella marattiae, Rac.
Melchioria—on Elettaria.
Nectriella pallidula, Penz. & Sacc.
Melocanna.
Konradia secunda, Rac.
Menispermaceae—dead leaves.
Acrospermum foliicolum, Berk.
Metroxylum longispinum—bark.
Lophiosphaeria schizostoma (Mont.) Trev.
Michelia velutina.
Goplana micheliae, Rac.
Scolecopeltis salacensis, Rac.
Monocot—dead bark.
Nectria hypoxantha, Penz. & Sacc.
Calonectria effugiens, Penz. & Sacc.
Monocot—leaves.
Myiocopron affine, Penz. & Sacc.
Monocot—dead leaves.
Cladotrichum mitratum, Penz. & Sacc.
Stilbum candidulum, Penz. & Sacc.
Monocot—dead stems.
Calonectria callorioides, Penz. & Sacc.
Mollisia orbilioides, Penz. & Sacc.
Mosquitoes.
Empusa grylli, (Fres.) Now.
Mucuna.
Parodiella mucunae, Rac.
Uromyces? mucunae, Rabenh.
Musci.
Gliocladium pulchellum, Penz. & Sacc.
Pezizella epibrya, Penz. & Sacc.
Myrica javanica.
Myxosporium candidissimum, Rac.
Myrsine affinis.
Epichloe montana, Rac.
Nephrodium heterophyllum.
Morenoella nephrodii, Rac.
Nephrolepis acuta.
Entyloma nephrolepidis, Rac.
Lembosia longissima, Rac.
Nicotiana tabacum.
Cercospora nicotianae, E. & E.
Phytophthora nicotianae, de Haan.
Pythium complens, Fischer.
Pythium vexans, De Bary.

Nipa fruticans.
Lembosia javanica, (Pat.) Rac.
Oryza sativa.
Napicladium janseanum, Rac.
Ustilaginoidea virens, (Cooke) Tak.
Palm—dead leaves.
Pezizella avellanea, Penz. & Sacc.
Trichobotrys pannosa, Penz. & Sacc.
Palm—dead petioles.
Anthostomella obtusispora, Penz. & Sacc.
Arenaea javanica, Penz. & Sacc.
Arenaea macrospora, Penz. & Sacc.
Aulographum atromaculans, Penz. & Sacc.
Anthostomella obtusispora, Penz. et Sacc.
Davincia tenella, Penz. & Sacc.
Didymobotrium atrum, Pat. var. pachysporum, Penz. & Sacc.
Helminthosporium nodipes, Penz. & Sacc.
Illosporium aureolum, Penz. & Sacc.
Melanconium profundum, Penz. & Sacc.
Melanomma leptosphaerioides, Penz. & Sacc.
Neomichelia melaxantha, Penz. & Sacc.
Oxydothis maculosa, Penz. & Sacc.
Phaeodiscula gonospora, Penz. & Sacc.
Rosellinia marginato-clypeata, Penz. & Sacc.
Sporocybe acicularis, Penz. & Sacc.
Sporodermium bogoriense, Penz. & Sacc.
Teichospora xenochaeta, Penz. & Sacc.
Trichopeziza melleo-rufa, Penz. & Sacc.
Trichosphaeria affinis, Penz. & Sacc.
Palm—dead rachises.
Brachysporum obovatum, (Berk.) Sacc.
Karschia tjibodensis, Penz. & Sacc.
Melanomma leptosphaerioides, Penz. & Sacc.
Palm—dead sheaths.
Belonidium glauco-fuligineum, Penz. & Sacc.
Palm—dead spathes.
Chilonectria macrospora, Penz. & Sacc.
Nectria dolichospora, Penz. & Sacc.
Ophionectria trichospora, (B. & Br.) Sacc.
Pandanus—dead leaves.
Anthostomella pandani, (Rab.) Sacc.
Erinella albo-flaveola, Penz. & Sacc.
Lophodermium javanicum, Penz. & Sacc., var. pandani, Penz. & Sacc.
Solenopeziza mellina, Penz. & Sacc.
Pandanus littoralis.
Hyponectria pandani, Rac.
Panicum.
Paikilosporium bogoriense, Rac.
Panicum formosum.
Capnodium stysanophorum, Penz. & Sacc.

Bemoivskia graminis, Rac.
Phyllachora stenospora, (B. & Br.) Sacc.
Pavetta silvatica.
Endophyllum griffithsiae, Rac.
Phaeomacropoda.
Mycogone echinulata, Penz. & Sacc.
Phaius.
Uredo phaji, Rac.
Phalloid fungus—volva.
Sepedonium chrysospermum, (Bull.) Fr.
Phanera.
Meliola curviseta, Rac.
Phaseolus.
Uromyces phaseoli, (Perk.) Lk.
Phyllanthus.
Oidium tabaci, Thuem.
Phyllostachys.
Uredo arundinariae, Sydow.
Phyllostachys—young twigs.
Konradia bambusina, Rac.
Physaria didermoides Roxb.—sporangia.
Hyponectria raciborskii, Penz. & Sacc.
Pierardia dulcis—seeds.
Aspergillus penicillopsis, (Henn. & Nym.) Rac.
Pinanga.
Kordyana pinangae, Rac.
Pistillaria sp.
Penicillium candidum, Link.
Pithecolobium lobatum.
Euryachora pithecolobii, Rac.
Uredo pithecolobii, Rac.
Plectocomia—dead petioles.
Boerlagella velutina, Penz. & Sacc.
Plectocomia—dead rachises.
Anthostoma tjibodense, Penz. & Sacc.
Plectocomia elongata—dead stems.
Winterella eutypoides, Penz. & Sacc.
Podocarpus (?)—dead limbs.
Diatrype parvula, Penz. & Sacc.
Polygonum sp.
Ustilago utriculosa, (Nees) Tul.
Polygonum chinense.
Puccinia solmsii, Henn.
Pongamia glabra.
Stigmatea pongamiae, Rac.
Polypodium longissimum.
Parmularia discoidea, Rac.
Psilotum flaccidum.
Myiocopron millepunctatum, Penz. & Sacc.
Psophocarpus tetragonolobus.
Woroninella psophocarpi, Rac.

Pterocarpus indicus.
Aldona stella-nigra, Rac.
Micronectria pterocarpi, Penz. & Sacc.
Ptychosperma—dead spathes.
Oxydothis nigricans, Penz. & Sacc.
Quercus—acorns.
Xylaria carpophila, Fr.
Quercus—dead leaves.
Dimerosporium hamatum, Penz. & Sacc.
Randia scandens.
Endophyllum griffithsiae, Rac.
Rhododendron javanicum.
Coccomyces rhododendri, Rac.
Cryptomyces rhododendri, Rac.
Exobasidium vulcanicum, Rac.
Rhododendron retusum.
Exobasidium vulcanicum, Rac.
Morenoella gedeana, Rac.
Rottlera floribunda.
Anthostomella rottlerae, Rac.
Rubus moluccanus.
Hamaspora longissima, Körn.
Saccharum officinarum.
Apiospora camptospora, Penz. & Sacc.
Hypocrea saccharina, Rac.
Melanconium sacchari, Massee.
Melanconium saccharinum, Penz. & Sacc.
Stictis arundinacea, Pers.
Trichoderma lignorum, (Tode) Harz.
Salacia—leaves.
Phyllachora amphididyma, Penz. & Sacc.
Scaevola koenigii.
Ramularia scaevolae, Rac.
Schizostachyum blumeanum.
(See Bambusa).
Scirpus—dead leaves.
Lophodermium raapianum, Penz. & Sacc.
Scleroderma—peridium.
Hypocrea sclerodermatis, Penz. & Sacc.
Shorea dyeri—leaves.
Meneda purpurea, Rac.
Smilax sp.
Puccinia prainiana, Barel.
Sorghum—culm.
Stictis arundinacea,
Spatholobus littoralis.
Neottispora longiseta, Rac.
Spermacoce.
Puccinia brevispora, Rac.
Spondias acida, borbonica, and *dulcis.*
Dietelia eviae, Rac.

Sponia virgata.
Asternia sponiae, Rac.
Dimerosporium occultum, Rac.
Stems—dead.
Boerlagella laxa, Penz. & Sacc.
Chromosporium pallens, Penz. & Sacc.
Byssonectria delicatula, Penz. & Sacc.
Epicoccum angulosum, Penz. & Sacc.
Helminthosporium bogoriense, Penz. & Sacc.
Nectria arundinella, Penz. & Sacc.
Nectria leucotricha, Penz. & Sacc.
Oxydothis grisea, Penz. & Sacc.
Stilbum perexiguum, Penz. & Sacc.
Torula heteromorpha, Penz. & Sacc.
Vermicularia dematium, (Pers.) Fr.
Xenopus farinosus, Penz. & Sacc.
Zythia abnormis, Penz. & Sacc.
Stephania capitata.
Trabutia stephaniae, Rac.
Sterculia subpeltata.
Lambro insignis, Rac.
Strophanthus dichotomus.
Hemileiopsis strophanthi, Rac.
Symplocos fasciculata.
Exobasidium symploci-fasciculatae, Rac.
Physalospora symploci, Rac.
Talauma mutabilis.
Clypeolum talaumae, Rac.
Tectona grandis.
Uredo tectonae, Rac.
Termites—nests.
Xylaria torrubioides, Penz. et Sacc.
Termites—nymphs.
Cordyceps koningsbergeri, Penz. et Sacc.
Terminalia catappa.
Ramularia catappae, Rac.
Tetracera.
Marssonia tetracerae, Rac.
Tetranthera.
Phyllachora laurinearum, Rac.
Tetranthera amara.
Aecidium litsaeae, Pat.
Thelymitra javanica.
Aecidium thelymitrae, Rac.
Thespesia populnea.
Physalospora hibisci, Rac.
Tinospora cordifolia and *crispa.*
Elsinoe menispermacearum, Rac.
Torenia asiatica.
Puccinia toreniae, Rac.
Tradescantia capitata.
Kordyana tradescantiae, (Pat.) Rac.

Trichia verrucosa—peridium.
Ophionectria trichiae, Penz. & Sacc.
Trunks—dead.
Aspergillus candidus, Liuk.
Corallomyces brachysporus, Penz. & Sacc.
Coryne javanica, Penz. & Sacc.
Didymobotryum obesum, Penz. & Sacc.
Mollisia viridulo-mellea, Penz. & Sacc.
Penzigia macrospora, Penz. & Sacc.
Podosporium casuarina, Penz. & Sacc.
Xylaria gigantea, Zipp.
Xylaria holodapha, Bk. var. camptospora, Penz. & Sacc.
Xylaria hyperythia, Mont.
Xylaria involuta, Kl.
Xylaria kegeliana, Lév.
Xylaria leucosticta, Penz. et Sacc.
Xylaria nigripes, Kl.
Xylaria polysticta, Penz. et Sacc.
Xylaria scopiformis, Mont.
Xylaria subterranea, (Schw.) Sacc.
Xylaria varians, Penz. & Sacc.
Xylaria xanthophaea, Penz. & Sacc.
Uredo spp.
Tuberculina persicinae, Detm.
Vaccinium teysmannianum.
Ahnella tristis, Rac.
Strumella annularis, Rac.
Vespa velutina.
Cordyceps oxycephala, Penz. & Sacc.
Vitis serrulata.
Elsinoe viticola, Rac.
Wood—rotting.
Acanthostigna scleranthoides, Penz. & Sacc.
Acrostalagmus cinnabarinus, Corda.
Amallospora dacrydion, Penz.
Amphisphaeria atro-grana, (C. & B.) Sacc.
Amphisphaeria callicarpa, Penz. & Sacc.
Arthropodium chrysocephalum, Penz. & Sacc.
Belonidium albo-cereum, Penz. & Sacc.
Bertea moriformis, (Tode) de Not.
Boerlagella velutina, Penz. & Sacc.
Calonectria aurantiella, Penz. & Sacc.
Chaetosphaeria pusilla, Penz. & Sacc.
Cudoniella javanica, Henn. subsp. microspora, Penz. & Sacc.
Excipula oospora, Penz. & Sacc.
Graphium leucophaeum, Penz. & Sacc.
Helminthosporium bogoriense, Penz. & Sacc.
Helminthosporium gigasporum, B. & Br. subsp. javanicum, Penz. & Sacc.
Helotium javanicum, Penz. & Sacc.
Helotium subserotinum, Henn. & Nym.
Hormosperma pusillum, Penz. & Sacc.

Hypocrea lenta, (Tode) Berk.
Hypoxylon bifrons, de Not.
Hypoxylon microstroma, Penz. & Sacc.
Leptosporella gregaria, Penz. & Sacc.
Leptosporella sparsa, Penz. & Sacc.
Letendraea atrata, Penz. & Sacc.
Listeromyces insignis, Penz. & Sacc.
Mollisia cinerea, (Batsch) Karst.
Myriococcum (?) spinuligerum, Penz. & Sacc.
Ophioceras hystrix, Sacc. subsp. tjibodensis, Penz. & Sacc.
Ophiochaeta raciborskii, Penz. & Sacc.
Ophionectria conica, Penz. & Sacc.
Orbilia macrospora, Penz. & Sacc.
Orbilia sinuosa, Penz. & Sacc.
Podobelonium citrino-album, Penz. & Sacc.
Pseudohelotium microcenangium, Penz. & Sacc.
Rosellinia mammiformis, (Pers.) Ces. & de Not.
Sordaria caudata, (Curr.) Sacc.
Sorokina insignis, Penz. & Sacc.
Spegazzinia ornata, Sacc.
Sporodesmium tenellum, Penz. & Sacc.
Stilbum macrosporum, Penz. & Sacc.
Trichosperma griseo-candidum, Penz. et Sacc.
Xylaria axifera, Mont.
Xylaria cupressiformis, (Mich.) Bece.
Xylaria diceras, Lév.
Zignoella eumorpha, Penz. & Sacc.

Wrightia javanica, mollissima and *tinctoria*.
Hemileiopsis wrightiae, Rac.

Xanthorrhoea—rotting wood.
Trichopeziza citrino-alba, Penz. & Sacc.

Zalacca—dead leaves.
Oncospora pezizella, Penz. & Sacc.

Zalacca—dead petioles.
Pezizella isabellino-rufa, Penz. & Sacc.

Zalacca—dead rachises.
Pirottaea versicolor, Penz. & Sacc.

Zea mais.
Peronospora maydis, Rac.

Zingiberaceae—dead stems.
Aleurina substipitata, Henn. var. pleuropoda, Penz. & Sacc.

C. F. Baker.

RAINFALL at the Director's house, Botanic Gardens, Singapore, during the first half of the year, 1917, in inches.
Readings taken always at 8 a.m. and credited to the date in which twenty-four hours begin.

Date.	Jan.	Feb.	March.	April.	May.	June.
1	.01	.01	.14	..	.01	.66
2	..	.11	.59	.02	..	.45
3	.05	..	.01	.12	..	.12
4	.65	trace	..	.55	trace	.05
5	.01	.09	2.79	..	..	2.87
6	.23	.53	2.66	.17	.15	.05
7	..	.21	.79	..	1.54	..
8	1.06	.20	.09	trace	.11	.28
9	3.22	.29	.02	..	.01	.01
10	2.72	.06	.02	.03	.01	..
11	.84	1.96	.92	2.32	.01	.62
12	.06	.37	.08	.51	..	.01
13	2.17	.45	.41	.27	..	..
14	.25	.14	.22	trace	.01	..
15	.55	..	.39	.04	.21	..
16	.08	2.68	.59	..	..	..
17	.16	.48	.57	..	..	..
18	.51	.42	.01	.02	.03	..
19	.01	.02	.15	.14	.05	.03
20	..	..	.06	.04	.01	..
21	.38	1.72	.04	..	.47	.10
22	..	1.61	..	.10	.06	..
23	..	.07	.02	..	..	..
24	.50	.12	.13	..	2.42	.18
25	trace	.58	.85	..	.05	..
26	.25	.01	.01	..	..	.01
27	.10	.05	.04	.02	.29	.01
28	.36	.65	trace	..	.04	.43
29	.41		..	.48	.03	.70
30	.04		.13	.35	..	..
31	.91		.05		..	
	15.43	12.83	11.78	5.48	5.51	6.58

RAINFALL at the Director's house, Botanic Gardens, Singapore, during the second half of the year, 1917, in inches.
Readings taken always at 8 a.m. and credited to the date in which twenty-four hours begin.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	82	.43	trace	..	1.85	1.64
2	.01	2.63	..	.28	.02	.08
3	..	..	.52	..	..	.27
4	.04	.10	..	..	..	.15
5	.05	.39	..	..	..	.02
6	..	.35	..	..	..	.82
7	..	.38	.95	1.56	.17	.01
8	.35	.12	.37	.51	..	.02
9	.04	.21	..	..	.60	.22
10	..	2.69	..	trace	.02	1.61
11	.08	.01	.08	..	.30	.63
12	.04	trace	.67	.23	.01	.28
13	.07	.51	1.29	.37	..	..
14	.35	1.41	trace	.89	.04	.18
15	.03	.06	trace	1.00	..	.02
16	..	..	1.34	.43	.58	.40
17	.02	.06	trace	.32	.01	.18
18	..	..	2.61	.19	.16	.22
19	..	..	.01	.27	.03	.27
20	..	..	.01	1.75	trace	.32
21	..	trace	trace	.67	..	.05
22	..	1.97	.02	.07	.36	.26
23	.11	1.37	.03	..	.03	.07
24	..	.14	.68	..	.04	..
25	.25	.83	1.63	.25	.02	.02
26	.11	.02	.36	..	..	trace
27	..	.02	..	..	.06	..
28	.03	trace	trace	..	.07	.54
29	..	1.02	.07	.01	.63	.03
30	..	.01	.03	.38	.01	.69
31	..	..		.02		.05
	2.40	14.73	10.67	9.70	5.01	9.05

RAINFALL at the head of the Waterfall Gardens, Penang, during the first half of the year, 1917, in inches.

Readings taken at 8 a.m. and credited to the date in which the twenty-four hours begin. Data kindly supplied by the Municipal Commissioners of Georgetown, Penang.

Date.	Jan.	Feb.	March.	April.	May.	June.
1	..	.04	.38	..	..	..
2	..	.02	.13	..	..	.21
3	..	..	..	..	.20	..
4	..	..	.47	..	..	..
5	.60	..	.12	.41	.08	..
6	.83	..	3.25	.36	.14	.07
7	.30	.44	.60	..	.20	2.20
8	..	.04	.03	..	1.23	.30
9	..	..	.21	..	.13	..
10	..	..	..	.17	.09	.15
11	..	..	..	.61	.55	1.33
12	..	..	.26	1.05	.04	.06
13	..	..	1.17	..	.10	..
14	.15	..	..	..	..	..
15	.10	..	..	.12	.13	..
16	1.02	.19	1.59	1.27	.05	..
17	..	.10	.60	..	..	..
18	..	.46	..	.76	..	..
19	..	..	..	.26	.54	..
20	..	..	..	..	1.90	..
21	..	..	..	.36	.30	..
22	..	.67	.13	.08	..	.40
23	.06	.36	1.62	1.56	..	..
24	..	.13	..	.27	..	.68
25	2.06	.07	..	..	.82	.24
26	.06	.08	..	..	..	..
27	..	.49	..	1.03	..	..
28	.46	.20	..	..	.31	..
29	..		..	.16	.20	2.08
30	..		..	..	..	.11
31	..		..		..	
	5.64	3.29	10.56	8.47	7.01	7.83

RAINFALL at the head of the Waterfall Gardens, Penang, during the second half of the year, 1917, in inches.

Readings taken at 8 a.m. and credited to the date in which the twenty-four hours begin. Data kindly supplied by the Municipal Commissioners of Georgetown, Penang.

Date.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	..	..	..	..	.08	..
2	..	.77	.90	..	1.22	1.88
3	.17	.19	1.23	1.32	..	..
4	1.21	.60	.49	..	..	.58
5	.80	.96	..	..	1.43	..
6	3.77	2.43	..	..	.33	..
7	1.57	..	1.22	.18	6.60	.57
8	.57	.24	.36	.03	.23	.10
9	.23	..	..	..	.73	..
10	..	.25	.20	.07	.03	..
11	..	..	..	1.36	..	..
12	.06	..	..	3.04	..	..
13	.04	..	..	.74	.80	.78
14	.83	.70	..	1.49	..	..
15	..	.55	.49	..	..	..
16	..	.54	.68	.25	..	.03
17	.65	..	.98	.65	.12	.13
18	.11	..	.99	.35	.15	.18
19	..	..	.48	.31	.14	..
20	.16	..	1.03	.97	..	.72
21	..	1.73	.06	.14	.17	.18
22	..	..	..	.79	..	.03
23	.13	.96	.59	..	..	.20
24	..	.10	2.49	..	.63	..
25	..	3.75	.85	..	.47	.64
26	.07	1.73	.39	..	..	..
27	..	.09	.04	..	..	..
28	..	..	.21	.18	..	.02
29	..	..	..	..	1.30	..
30	..	.33	..	..	.55	..
31	.42	..		..		..
	10.79	15.92	13.68	11.87	14.98	6.04

SUMMARY OF RAINFALL.

	SINGAPORE.			PENANG.		
	No of rainy days.	Amount of rain in inches.	Longest Spell without rain.	No. of rainy days.	Amount of rain in inches.	Longgest Spell without rain.
January - -	26	15.43	2	10	5.64	8 (partly in Dec. 1916.
February -	25	12.83	1	14	3.29	7
March - -	28	11.78	1	14	10.56	
April - -	18	5.48	4	15	8.47	12
May - -	20	5.51	2	18	7.01	3
June - -	17	6.58	6	12	7.83	9
July - -	16	2.40	3	16	10.79	4
August - -	25	14.73	3	17	15.92	4
September -	23	10.67	3	19	13.68	4
October - -	19	9.70	4	16	11.87	15
November -	21	5.01	4	17	14.98	3
December -	28	9.05	1	14	6.04	4
Total	266	109.18	—	182	116.08	—
Greatest amount in 24 hours ...		3.22			6.60	
,, ,, 48 ,, ...		5.94			6.93	
,, ,, 72 ,, ...		7.00			8 36	
Excessively rainy periods, more than 5.00 having fallen in 72 hours (January and March.) - - -		2			4 (July, Aug., Oct. and Nov.)	
No. of days when the condition persisted		4			10	
Periods of comparative drought less, than 0 02 having fallen in 120 hours - -		2			8	
No. of days when the condition existed (3 in June, 1 in July.)		4			26 (4 and 2 and 2 in Jan., 3 in Feb., 8 in Feb.-Mch., 5 in June, 1 in Sept., and 1 in Oct.).	